KOKAI PATENT APPLICATION NO. HEI 7-268380

WATER-BASED LUBRICANT COMPOSITION

[Translated from Japanese]

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Title of Invention:

WATER-BASED LUBRICANT COMPOSITION

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[*There are no amendments to this patent.*]

[*Translator's note: Names of products and companies are spelled phonetically in this translation.*]

[*Translator's note: The term "silicon" is used consistently in the source document where we believe the correct term should be "silicone". Occurrences have been noted.*]

Specification

[Title of the invention]

Water-based lubricant composition

[Abstract]

[Constitution] A water-based lubricant composition comprising at least a silicon [sic] grease, an alkali soap that remains solid at room temperature and water.

[Effect] Production of a water-based lubricant composition with less likelihood of ignition,

excellent lubricating effect without causing environmental pollution and stress cracking and corrosion of metals.

[Claim of the invention]

[Claim 1] A water-based lubricant composition comprising at least a silicon [sic] grease, an alkali soap that remains solid at room temperature and water.

[Detailed description of the invention]

[0001]

[Field of industrial application] The present invention pertains to a lubricant composition capable of preventing abrasion and providing suitable sliding resistance when provided between a component and a component that slides against the aforementioned component.

[0002]

[Prior art] In general, a lubricant is coated onto the contact surface between a component and an object that comes in contact with the aforementioned component and slides or rotates against the aforementioned component to provide a suitable sliding resistance. For the lubricant composition used in this case, silicon [sic] grease itself is used or a silicon [sic] grease diluted with an organic solvent is used.

[0003] Furthermore, as a water-based lubricant composition, a silicon [sic] emulsion produced by dispersing a silicon [sic] oil in a nonionic surfactant is used.

[0004]

[Problems to be solved by the invention] In a lubricant composition where silicon [sic] grease alone is used, the viscosity is too high and handling is difficult, and when diluted with an organic solvent, flammability is high and it is not only dangerous but also leads to environmental pollution. Thus, a silicon [sic] emulsion with low flammability and absence of environmental pollution has been developed, but the lubricating effect is inferior since the silicon [sic] oil is dispersed in water with a surfactant, and stress cracks are likely to occur.

[0005]

[Means to solve the problem] The present invention is based on the above background and the purpose of the present invention is to produce a water-based lubricant composition comprising at least a silicon [sic] grease, an alkali soap that remains solid at room temperature, and water.

[0006] The present invention is explained in further detail below. For silicon [sic] greases widely used as lubricant compositions and having low volatility and a low coagulation point, those produced by mixing a silicon [sic] oil with a fatty acid such as myristic acid, palmitic acid and stearic acid and a metal soap comprised of a salt with a metal other than an alkali metal such as magnesium, calcium and aluminum, and those with a fatty acid ester further added can be mentioned. And for specific examples, Silicon G501 (75 wt% of silicon [sic] oil KF96, viscosity 500 C.P [sic], and 25% of metal soap and additives, product of Shinetsu Chemical Co., (Ltd.)), TSK5450 (product of Toshiba Silicon [transliteration] Co., (Ltd.)) can be mentioned. Furthermore, for the aforementioned fatty acid, animal oils and vegetable oils other than those described above can be mentioned, and for specific examples, coconut hardened fatty acids, coconut fatty acids, beef tallow fatty acids, soybean fatty acids, etc. are used.

[0007] In this case, an alkali soap that remains solid at room temperature is used to disperse the aforementioned silicon [sic] grease and to prevent cracks (stress cracks) of the resin or corrosion of metals. The aforementioned alkali soap that remains solid at room temperature is a salt of a fatty acid such as coconut fatty acid or beef tallow fatty acid and an alkali metal such as sodium or potassium, for example, Nonsal TN-1, Nonsal SN-1, Nonsal ON-1, Nonsal PN-1, FA-NS (all products of Nippon Yushi [Japan Fats and Oils] Co., (Ltd.)).

[0008] Water is a solvent used as a dispersant of silicon [sic] grease. Desired mixing ratios of the aforementioned raw materials are shown below. The amount of silicon [sic] grease used is preferably in the range of 1.0 parts by weight to 50.0 parts by weight. When the amount of silicon [sic] grease used is 1.0 parts by weight or below, the lubricating effect becomes inadequate at times; on the other hand, when 50.0 parts by weight or above is used, the viscosity of the composition becomes too high and handling is difficult at times. Furthermore, the amount

of alkali soap used is preferably in the range of 0.05 parts by weight to 2.00 parts by weight. When the amount used is 0.05 parts by weight or below, uniform dispersing of silicon [sic] grease into water is not possible; on the other hand, when the amount of alkali soap used is 2.00 parts by weight or above, the liquid undergoes gelation and viscosity is increased, and handling is difficult.

[0009] Production of the present invention can be easily achieved by mixing and kneading the aforementioned raw materials using a stirrer equipped with stirring blades or a Henschel mixer. In this case, when heating is further provided, mixing and kneading can be easily achieved.

[0010]

[Work of the invention] A silicon [sic] grease is a lipophilic material produced by kneading a silicon [sic] oil and metal soap. Alkali soaps include a lipophilic fatty acid group and a hydrophilic alkali metal group and the lipophilic fatty acid group has affinity with silicon [sic] grease and forms a bond and the hydrophilic alkali metal group that has affinity with water and disperses in water.

[0011]

[Working Examples]

Working Example 1

2.5 parts by weight of Silicon [transliteration] G501 (silicon [sic] grease, product of Shinetsu Chemical Co., (Ltd.))

0.1 parts by weight of Nonsal TN-1 (alkali soap, product of Nippon Yushi Co., (Ltd.)).

97.4 parts by weight of water

Among the aforementioned components, mixing was provided for Silicon [transliteration] G5-1, Nonsal TN-1 and 0.5 parts by weight of water while heating to 80 deg C and kneading was provided; then, 96.9 parts by weight of water was added and further stirring and mixing were provided to produce a water-based lubricant composition.

[0012] Comparative Example 1

2.5 parts by weight of Silicon [transliteration] G501 (silicon [sic] grease, product of Shinetsu Chemical Co., (Ltd.))

0.1 parts by weight of Nonsal OK-1 (alkali soap, product of Nippon Yushi Co., (Ltd.)).

97.4 parts by weight of water

A water-based lubricant composition was produced with the aforementioned components as in the case of the aforementioned Working Example 1.

[0013] Working Example 2

20.0 parts by weight of TSK5450 (silicon [sic] grease, product of Toshiba Silicone [transliteration] Co., (Ltd.))

0.8 parts by weight of Nonsal TK-1 (alkali soap, product of Nippon Yushi Co., (Ltd.)).

89.2 parts by weight of water

Among the aforementioned components, mixing was done for TSK5450, Nonsal TK-1 and 4.0 parts by weight of water while heating to 80 deg C and kneading; then, 85.2 parts by weight of water was added and further stirring and mixing were provided to produce a water-based lubricant composition.

[0014] Comparative Example 2

20 parts by weight of TSK5450 (silicon [sic] grease, product of Toshiba Silicone [transliteration] Co., (Ltd.))

0.8 parts by weight of MYS-25 (alkali soap, product of Nikko Chemical Co., (Ltd.)).

89.2 parts by weight of water

A water-based lubricant composition was produced with the aforementioned components as in the aforementioned Working Example 2.

[0015] Working Example 3

40.0 parts by weight of Silicon [transliteration] G501 (silicon [sic] grease, product of Shinetsu Chemical Co., (Ltd.))

1.2 parts by weight of FA-NS (alkali soap, product of Nippon Yushi Co., (Ltd.)).

58.8 parts by weight of water

Among the aforementioned components, mixing was provided for Silicon [transliteration] G501, FA-NS and 6.8 water while heating to 80 deg C and kneading; then, 52.0 parts by weight of water was added and further stirring and mixing were done to produce a water-based lubricant composition.

[0016] Comparative Example 3

A silicon [sic] emulsion (tradename: KM740, product of Shinetsu Chemical Co., (Ltd.)) was used as Comparative Example 3.

[0017] Water-based lubricant compositions produced in the aforementioned Working Examples 1 to 3 and Comparative Examples 1 to 4 were used and lubricity tests, crack formation tests, and corrosion tests were conducted. The results obtained are shown in Table I below.

[0018]

[Table I]

	Use of organic solvent	Lubricity	Crack formation	Corrosion
Working Example 1	O	O	O	O
Working Example 2	O	O	O	O
Working Example 3	O	O	O	O
Comparative Example 1	O	O	O	X
Comparative Example 2	O	O	X	O
Comparative Example 3	O	X	O	O

[0019] Lubricity test: [A sample] was coated onto the tapered sliding unit of a side-knock type mechanical pencil such as the one shown in Fig. 1, dried and an evaluation was made based on ease in clicking.

O: very good

X: inferior

[0020] Crack formation test: [A sample] was coated onto a tapered sliding unit of a side-knock type mechanical pencil such as the one shown in Fig. 1, dried, and stored for one month at room temperature and the presence of stress cracks was confirmed by a microscope.

O: absence of cracks

X: cracks observed

[0021] Corrosion test

[The sample] was coated onto a brass sheet, dried, and stored for one month at room temperature and the presence of corrosion was confirmed by a microscope.

O: absence of corrosion

X: corrosion observed

[0022] Use of organic solvent

O: used

X: not used

[0023] The aforementioned side-knock type mechanical pencil used for the aforementioned tests is explained briefly below. Lead core delivery mechanism 4 comprising chuck member 2 and chuck ring 3 that opens and closes the aforementioned chuck member 2, etc. is provided so that it is free to slide when activated by spring-like component 5 inside shaft cylinder 1. Furthermore, tapered block 6 having inclined surface 6a is attached to the aforementioned lead core delivery mechanism 4. Furthermore, the aforementioned tapered block 6 is fitted with compression member 7 attached to the side face of the shaft cylinder 1. When pressure is applied to the aforementioned compression member 7, end member 7a of the compression member 7 applies

pressure to the inclined surface 6a of the tapered block 6 while sliding on the aforementioned surface. The aforementioned tests were performed with the lubricant of the present invention coated on inclined surface 6a of tapered block 6 of the aforementioned mechanical pencil.

[0024]

[Effect of the invention] In the present invention, a water-based lubricant composition comprising at least a silicon [sic] grease, an alkali soap that remains solid at room temperature, and water is used, and as a result, production of a water-based lubricant composition with a lower likelihood of ignition, excellent lubricating effect without causing environmental pollution, and absence of stress cracks and corrosion of metals is made possible.

[Brief description of the figure]

[Fig. 1] A vertical cross-section view of a side-knock type mechanical pencil used for the aforementioned tests.

[Explanation of codes]

1 shaft cylinder

2 chuck member

3 chuck ring

4 lead core delivery mechanism

5 spring-like component

6 tapered block

6a inclined surface

7 compression member

7a fitting member

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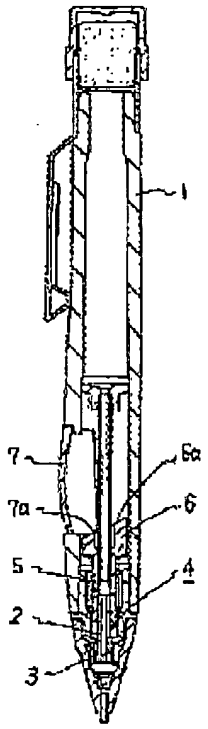
[Fig. 1]



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